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## AUTHORSHIP PATTERN AND COLLABORATIVE RESEARCH IN ASTROPHYSICS

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### **Abstracts:**

The study presents the trends in authorship pattern and authors collaborative research in Astrophysics with a sample of 411 articles during the period 2008-2017. The study found single author has contributed 133 with (32.3 %), Multi authored articles are dominant i.e. 278 (67.6 %). The mean value for the overall degree of collaboration for the 2008-2017 is found to be 0.67, the collaboration index increased from 5.18 in 2008 to 8.22 in 2017 with an average of 4.00. The collaborative co-efficient for the year 2008 is 0.51 which increased gradually to 0.54 in 2017 with an average of 0.49. The most prolific author is Del Zanna, Giulio who published 15 publications followed by Spitaleri, C. published 10 publications. Without Collaboration stood first place in levels of collaboration with 133 (32.3%).

**Keywords:** Authorship pattern, Astrophysics.

### **Introduction:**

Authorship studies mainly deal with kind of authors, nature and degree of collaboration among them. The authorship studies can be carried out both for citing and cited articles. The various kinds of authors appeared in publications are grouped as personal author works, corporate body and anonymous publications.

Astrophysics is a division of space science that applies the laws of physics and chemistry to explain the birth, life and death of stars, planets, galaxies, nebulae and other objects in the universe. It has two fraternal sciences, astronomy and cosmology, and the lines between them blur.

### **Methods & Materials:**

The data has been extracted from SCOPUS international multidisciplinary database for database for the present study and the following search strategy has been used in the combined field of Title, Abstract & Keywords. TITLE (*astrophysics*) AND DOCTYPE (*ar*) AND PUBYEAR > 2007 AND PUBYEAR < 2018 AND (LIMIT-TO (SUBJAREA, "PHYS")) AND (EXCLUDE (AFFILCOUNTRY, "Japan") OR EXCLUDE (AFFILCOUNTRY, "China"))

### **Review of Literature:**

**Elango & Rajendran** (2012) have investigated the authorship trend and collaboration pattern in Marine Sciences literature. For this purpose, the required data has been collected from the Indian Journal of Marine Sciences published from 2001 to 2010. Scientometric trappings such as, collaboration index, collaboration co-efficient and dominance factor have been used. Applicability of Lotka's law has been tested. Further, level of association has been observed among the authors. The study reveals that the coauthored papers are dominated and the author productivity follows the Lotka's law. Average collaboration rate (0.57) is better collaboration and mean amount of authors per joint authored paper is 3.4.

**Kanekar & Siddiqui** (2018) have analyzed the trends in authorship pattern and authors collaborative research in Rainwater Harvesting with a sample of 959 articles during the period 2007-2016. Multi authored articles are dominant i.e. 878 (91.5%). The mean value for the overall degree of collaboration for the 2007-2016 is found to be 0.91, the collaboration index increased from 2.7 in 2007 to 3.59 in 2016 with an average of 2.75. The collaborative co-efficient for the year 2007 is 0.64 which increased gradually to 0.68 in 2016 with an average of 0.58. The total average number of authors per paper is 3.81 and the average productivity per author is 0.26.

**Nishvathi & Jeysankar** (2018) in their study focused on collaborative measures of published documents in the field of chromosome anomalies. It argues about inadequacies of collaborative measures in analyzing the collaborating behavior and strength of collaboration in a discipline. The database PubMed is used as foundations for bibliometrics and 35912 citations inspected for co – authorship pattern, collaborative behavior of the scientists.

### Objective of the Study:

1. To identify the authorship pattern of Astrophysics Research.
2. To identify the year-wise degree of collaboration.
3. To identify the Collaboration Index.
4. To identify the collaboration coefficient.
5. To identify most prolific contributors.
6. To identify Distribution of Level of Collaboration

### Data Analysis:

The study aims at to ascertain the Authorship pattern, Collaborative measures and level of Distribution in the field of Astrophysics during the period 2008-2017.

**Table 1: Authorship Pattern**

No. of Authors	No. of Papers	%	Cumulative %
<b>Single</b>	133	<b>32.3</b>	<b>32.3</b>
<b>Two</b>	57	<b>13.8</b>	<b>46.1</b>
<b>Three</b>	54	<b>13.1</b>	<b>59.2</b>
<b>Four</b>	37	<b>9.00</b>	<b>68.2</b>
<b>Five</b>	21	<b>5.10</b>	<b>73.3</b>
<b>Six</b>	21	<b>5.10</b>	<b>78.4</b>
<b>Seven</b>	10	<b>2.43</b>	<b>80.8</b>
<b>Eight</b>	13	<b>3.16</b>	<b>83.9</b>
<b>Nine</b>	9	<b>2.18</b>	<b>86.1</b>
<b>Ten</b>	4	<b>0.97</b>	<b>87.1</b>
<b>&gt;Ten</b>	<b>51</b>	<b>12.4</b>	<b>99.5</b>
<b>Unidentified</b>	<b>1</b>	<b>0.22</b>	<b>99.7</b>
<b>Total</b>	<b>411</b>	<b>100</b>	<b>100</b>

Table 1 identified Number of authors range between 1 and More than 10 Out of 411 papers, a single author has contributed 133 with (32.3 %), (13.8) % of papers were published with two authors 57, 13.1% of papers were published by three authors (54), 9.00 % of the contributions were published by four authors (37), 5.10 % of the contributions were published by five authors (21), 5.10 % of the contributions were published by six authors (21), 2.43 % of articles were produced by seven authors (10). 18.71 % of articles were published by more than seven authors (77).Remaining 0.22 % of contributed by unidentified author 1.

## **Collaborative Measures**

Measures of collaboration to show the trend towards multiple authorships in a discipline, many studies have used either the mean number of authors per paper, termed the CI by Lawani (1980) and the proportion of multiple authored papers, called Degree of Collaboration (DC) by Subramanyam (1983) as a measure of the strength of collaboration in a discipline. Assuming that these two measures were seems to be inadequate, Ajiferuke et al. (1988), who derived a single measure that incorporates some of the merits of both of the above. Ideally, it is desired that a quantification of collaboration should have a value between 0 and 1, with 0 corresponding to single authored papers, and 1 for the case where all papers are maximally authored, i.e. every publication in the assemblage has all authors in the collection as coauthors. All the above mentioned formulas to find the collaboration coefficient (CC) value have one or other demerit. To overcome some of the demerits of previously explained measures, and propose a simple modification of CC.

### **Degree of Collaboration**

The Degree of Authors Collaboration is shown in Table No. 2. The different methods have been proposed to calculate the degree of research collaboration. Here in this study the formula projected by Subramanyam (1983) has been used.

The degree of collaboration

$$C = \frac{NM}{Nm+Ns}$$

Where,

C = degree of collaboration

Nm = number of multi author

Ns = number of single author

$$C = \frac{278}{133+278} = 0.67$$

**Thus the degree of collaboration (C) 0.67**

So, in the study the degree of collaboration during the overall 10 years (2008-2017) is 0.67.

**Table 2: Degree of Collaboration**

<b>Year</b>	<b>Single Author (NS)</b>	<b>Multi Author (NM)</b>	<b>Total NM+NS</b>	<b>Degree of Collaboration</b>
<b>2008</b>	15	29	44	<b>0.65</b>
<b>2009</b>	17	29	46	<b>0.63</b>
<b>2010</b>	14	25	39	<b>0.64</b>
<b>2011</b>	13	23	36	<b>0.63</b>
<b>2012</b>	11	31	42	<b>0.73</b>
<b>2013</b>	17	30	47	<b>0.63</b>
<b>2014</b>	18	31	49	<b>0.63</b>
<b>2015</b>	6	29	35	<b>0.82</b>
<b>2016</b>	12	30	42	<b>0.71</b>
<b>2017</b>	10	21	31	<b>0.67</b>
<b>Total</b>	<b>133</b>	<b>278</b>	<b>411</b>	<b>0.67</b>

Table 2 Degree of Collaboration of authors by year-wise falls between 0.65 and 0.67 with an average of 0.67 during the study period. From 2008 to 2017, it has been increased gradually. The multi author articles are higher and predominant than single author. The multi authored articles are highest in year 2012 with 31 papers. Single authored articles are highest in the year 2014 with 18 papers.

### **Collaboration Index**

The simplest of the indices presently employed in the literature is the Collaboration Index, CI, which is to be interpreted merely as the mean number of authors per paper.

$$CI = \frac{\sum_{j=1}^A jf_j}{2a}$$

**Table 3: Collaboration Index**

<b>Year</b>	<b>Single Author</b>	<b>Two Authors</b>	<b>Three Authors</b>	<b>Three &amp; above authors</b>	<b>CI</b>
<b>2008</b>	15	4	5	20	<b>5.18</b>
<b>2009</b>	17	6	8	15	<b>3.39</b>
<b>2010</b>	14	6	6	13	<b>6.15</b>
<b>2011</b>	13	5	4	14	<b>2.33</b>
<b>2012</b>	11	7	2	22	<b>3.09</b>
<b>2013</b>	17	9	4	17	<b>3.08</b>
<b>2014</b>	18	4	10	17	<b>2.24</b>
<b>2015</b>	6	2	8	19	<b>5.73</b>
<b>2016</b>	12	10	4	16	<b>2.5</b>
<b>2017</b>	10	4	3	14	<b>8.22</b>
<b>Total</b>	<b>133</b>	<b>57</b>	<b>54</b>	<b>167</b>	<b>4.00</b>

Table 3 shows Collaboration index (CI) that is a measure of mean number of authors per paper, CI among the years 5.18 (2008) and 8.22 (2015) with an average of 4.00; indicating the trend towards multi-authorship publications in the field of Astrophysics literature.

### **Collaborative Co-efficient**

The patterns of co-authorship among different countries have been examined by making use of Collaborative Coefficient (CC) suggested by Ajiferuke et al (1988). The formula used for calculating CC is given below:

$$CC = 1 - \frac{\sum_{j=1}^A \left(\frac{1}{j}\right) f_j}{N}$$

**Table 4: Collaborative Co-efficient**

<b>Year</b>	<b>Single Author</b>	<b>Two Authors</b>	<b>Three Authors</b>	<b>Three &amp; above authors</b>	<b>CC</b>
<b>2008</b>	15	4	5	20	<b>0.51</b>
<b>2009</b>	17	6	8	15	<b>0.46</b>
<b>2010</b>	14	6	6	13	<b>0.45</b>
<b>2011</b>	13	5	4	14	<b>0.40</b>
<b>2012</b>	11	7	2	22	<b>0.54</b>
<b>2013</b>	17	9	4	17	<b>0.46</b>
<b>2014</b>	18	4	10	17	<b>0.46</b>
<b>2015</b>	6	2	8	19	<b>0.64</b>
<b>2016</b>	12	10	4	16	<b>0.49</b>
<b>2017</b>	10	4	3	14	<b>0.54</b>
<b>Total</b>	<b>133</b>	<b>57</b>	<b>54</b>	<b>167</b>	<b>0.49</b>

Table 4 identified collaborative co-efficient for the year 2008 is 0.51 which increased gradually to 0.54 in 2017 with an average of 0.49. According to Ajiferuke , CC tends to be 0 as single-authored papers dominate and near 1 tends to be co-authored papers dominate. The mean value is 0.49 which indicates the better collaboration rate among the authors.

**Table 5: Most prolific contributors**

<b>Sl. No.</b>	<b>Name</b>	<b>No. of Contributions</b>	<b>Rank</b>
1	Del Zanna, Giulio	15	1
2	Spitaleri, C.	10	2
3	La Cognata, M.	9	3
4	Schatz, H.	8	4
5	Badnell, N.R.	7	5



6	Pizzone, R.G.	7	5
7	Storey, P.J.	7	5
8	Elekes, Z.	6	6
9	Fülöp, Z.	6	6
10	Gyürky, G.	6	6
11	Rolfs, C.	6	6
12	Somorjai, E.	6	6
13	Tumino, A.	6	6
14	Wiescher, M.	6	6
15	Allen, S.W.	5	7
16	Bemmerer, D.	5	7
17	Cherubini, S.	5	7
18	De Angelis, A.	5	7
19	Guglielmetti, A.	5	7
20	Lamia, L.	5	7
21	Mukhamedzhanov, A.M.	5	7
22	Bandler, S.R.	4	8
23	Blackmon, J.C.	4	8
24	Broggini, C.	4	8

Table 5 shows that the most prolific authors are Del Zanna, Giulio who published 15 articles followed by Spitaleri, C. published 10 articles; La Cognata, M. contributed 9 publications, Schatz, H. contributed 8 publications respectively.

**Table 6: Distribution of Level of Collaboration**

Level of Collaboration	Papers	%	Cumulative %
Without Collaboration (Single authored)	133	32.3	32.3
Collaboration with International Institutions	118	27.7	64.6
Collaboration with another Institution (same country)	99	25.0	89.6
Collaboration within the same institutions	61	14.8	100
Total	411	100	/

Table 6 identified the distribution of different levels of collaboration among the authors of the papers. It shows that the highest number of paper of Without Collaboration 133 (32.3%)

followed by Collaboration with International Institutions, Collaboration with another Institution within country, and Collaboration within the same institutions with 118 (27.7%), 99 (25.0%), 61 (14.8%) respectively.

### **Conclusions:**

Authorship pattern and productivity are the important parameters in order to study Authorship Pattern. Study is based on 411 articles during the period 2008-2017. It provides the Authorship pattern, Collaborative measures and level of Distribution

1. Multi authored contributions are dominated in the field of Astrophysics.
2. The mean value for the overall and Degree of Collaboration for the year 2008-2017 is found to be 0.67.
3. Average number of authors per joint authored paper is 4.00.
4. Average Collaboration rate (0.49) shows the better collaboration among the authors.
5. Del Zanna, Giulio has identified most productive author
6. 32.2% of the papers are collaborated without Collaboration.

### **Refereices:**

Ajiferuke, I. (1988). Collaborative Co- efficient : A single measure of the degree of collaboration in research, *Scientometrics*, 14(5-6), 421-433.

Astrophysics. (n.d.). Retrieved from <http://unllib.unl.edu/LPP/thanuskodi-bibmet.pdf>

Elango, B. & Rajendran, P. (2012). Authorship trends and collaboration pattern in the marine. *International Journal of Information Dissemination and Technology*, 2(3), 166-169.

Kanekar, V.B. & Siddiqui, E.A. Dr. (2018). Authorship Pattern and Collaborative Research in Rainwater Harvesting. *Journal of Advances in Library and Information Science*, 7(1). 72-76.

Lawani, S.M. (1980). Quality Collaboration and citations in cancer research : A bibliometric study. Ph.D Dissertation, Florida State University, 395p.

Nishavathim F. & Jeyshankar, R. Dr. (2018). Measuring Co- authorship Pattern in Research Output of Chromosome Anomalies. *Library Philosophy and Practice (e-journal)*. 1730. <https://digitalcommons.unl.edu/libphilprac/1730>

Subramanyam, K. (1983). Bibliometric studies of research collaboration: a review. *Journal of Information science*, 6, 33-38.